

# Development and Preliminary Evaluation of the Transsexual Voice Questionnaire for Male-to-Female Transsexuals

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**Summary: Objective.** This study reports on the preliminary psychometric evaluation of the Transsexual Voice Questionnaire for Male-to-Female Transsexuals (MtF)—TVQ<sup>MtF</sup>, a tool designed to measure the perceptions of MtF transsexuals regarding their voice. The TVQ<sup>MtF</sup> evolved from an extensive review of the existing Transgender Self-evaluation Questionnaire (TSEQ).

**Study Design.** This study was conducted in two phases. In phase I, the TSEQ was reviewed. In phase II, classical test theory was applied to examine two psychometric properties (internal consistency and test-retest reliability) of the TVQ<sup>MtF</sup>.

**Method.** In phase I, two speech pathologists and two MtF individuals reviewed the TSEQ, and a comparison was made with the results of a thematic analysis of 137 voice-related extracts from the transcripts of in-depth interviews with 14 MtF individuals. In phase II, 29 Australian and six Canadian MtF transsexuals completed the new tool, the TVQ<sup>MtF</sup> twice with an interim period of 4–6 weeks to enable psychometric evaluation.

**Results.** Phase I led to substantial changes to the content and structure of the original measure, the TSEQ, and the subsequent development of the TVQ<sup>MtF</sup>. In phase II, internal consistency of the TVQ<sup>MtF</sup> was found to be high (time 1 Cronbach's  $\alpha = .964$ ; time 2  $\alpha = .974$ ). Excellent test-retest reliability was demonstrated (intraclass correlation coefficient = 0.979; 95% confidence interval = 0.968–0.988).

**Conclusions.** This study provides psychometric evidence of the reliability of the TVQ<sup>MtF</sup>. The MtF participants in this study reported a wide range of vocal functioning and voice-related difficulties. Voice pitch was reported as the most problematic aspect of vocal functioning, and psychosocial issues were the most frequently reported voice-related impacts.

**Key Words:** Self-report measure—Vocal function—Psychosocial impact—Activity/participation—Transsexual.

## INTRODUCTION

The diagnosis of transsexualism is applied to individuals with a persistent cross-gender identification who “desire to live and be accepted as a member of the opposite sex.”<sup>1</sup> Male-to-female (MtF) transsexuals who wish to “pass” in society as an affirmed female typically present to voice clinicians requesting modification of what they perceive to be a gender nonconforming voice.<sup>2,3</sup> Negative societal reactions to those with visible gender nonconformity are widespread, with MtF individuals experiencing “continuous discrimination and inequality in all aspects of their lives: their jobs, their homes, and on the street” (p20).<sup>4</sup> As voice is a salient factor in perceptions of gender,<sup>5,6</sup> a gender nonconforming voice not only places the individual at risk of feelings of inadequacy<sup>7</sup> but also holds the potential for a significant psychosocial impact in MtF individuals.<sup>8,9</sup> A comprehensive assessment of voice in MtF individuals therefore requires a measure of the individual's perception of voice and its impact on everyday life.

The International Classification of Functioning, Disability and Health (ICF) framework<sup>10</sup> combines biological, individual, and societal points of view in establishing the health status of an individual. In recent years, the ICF has been applied to a variety of communication disabilities.<sup>11–13</sup> Using a qualitative research design and reporting her findings for MtF transsexuals according to the ICF, Byrne<sup>2</sup> provided a rare insight into the relationship between voice and negative societal responses, passing in society, and being accepted as female. Byrne's findings confirmed that MtF individuals experienced “substantial” limitations to activity, restriction to participation in life roles, and diminished psychosocial well-being. The participants attributed the impact of voice to environmental factors (such as societal attitudes) and personal factors (such as the individual's expectations of voice functioning). Pasricha et al<sup>14</sup> also reported that societal attitudes toward the MtF individual result in activity limitations and participation restrictions. In addition, their findings confirmed that self-perception of voice and its impact varied according to a variety of contextual factors relating to both those with whom the individual interacted and the environments in which interaction took place.

In view of the potential for significant psychosocial impact of voice on the MtF transsexual individual, a comprehensive speech pathology assessment requires clinicians to include an investigation of the individual's perceptions of voice-related difficulties and impacts on their everyday life. The importance of gathering these perceptions is further highlighted by reports demonstrating that improvements in voice pitch do not

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necessarily result in listeners perceiving a voice as female.<sup>15,16</sup> Similarly, clinicians' perceptions of the MtF individual's voice do not always relate to client satisfaction with their voice.<sup>17,18</sup> Traditionally, voice assessment has included both instrumental and auditory-perceptual evaluation. This approach, however, is likely to have limited ecological validity for assessment purposes or for evaluation of therapy outcomes. Although instrumental and auditory-perceptual measurements of voice are important components of voice assessment, the addition of self-report measures is necessary to capture the individual's perception of vocal functioning in their own life context. This article concerns the development of such a self-report measure.

Since the late 1990s, several psychometrically evaluated self-report scales related to vocal functioning have become available. These scales measure voice impairment and limitations to activity and participation in every-day life as well as emotional well-being.<sup>19</sup> These tools are sometimes loosely referred to as voice-related quality-of-life measures, although they do not measure quality of life directly, but rather factors that may contribute to quality of life.<sup>19</sup> Examples of these scales include the Voice Handicap Index (VHI),<sup>20</sup> Voice-Related Quality of Life (V-RQOL) scale,<sup>21</sup> Voice Activity and Participation Profile,<sup>22</sup> and the Voice Symptom Scale.<sup>23</sup> Only one self-report scale, the Transgender Self-evaluation Questionnaire (TSEQ), has been developed specifically for MtF transsexuals.<sup>24</sup>

The importance of using population-specific tools in assessment is highlighted by findings reported by T'Sjoen *et al.*<sup>25</sup> Before the availability of the TSEQ, T'Sjoen *et al.*<sup>25</sup> reported on the use of the VHI with 28 MtF transsexual individuals. Acknowledging that MtF transsexuals often reported difficulty being perceived as female on the telephone, the authors added an item to the VHI asking about the experience of gender identification on the telephone. The authors found a different response pattern to the VHI items and this population-specific item. The results for the VHI items indicated "no/slight disability" for the participants. However, responses to the additional item relating to perceptions of gender on the telephone indicated considerable disability. The authors concluded that the VHI did not capture the extent of voice-related disability experienced by MtF transsexuals.

The TSEQ was developed in 2006 by the second author, speech-language pathologist, S.D., in response to the need for a customized tool. The TSEQ is the only known tool available in English for measuring MtF transsexuals' perceptions of their voice function and the impact of voice on their everyday lives. The TSEQ is based on the psychometrically validated VHI.<sup>20</sup> Like the VHI, the TSEQ is a 30-item self-report questionnaire. Drawing on her extensive clinical experience with transsexual individuals, S.D. reviewed the original VHI questions for their relevance to this population. A number of the VHI items were deleted or modified. Two transsexual individuals were then asked to provide feedback regarding the appropriateness of the questionnaire items leading to further modifications. The final version of the TSEQ maintained only one-third of the original VHI items. Although S.D. did informally consider content validity during the development of the TSEQ (Personal Com-

munication, May 25, 2008), it was developed to serve an immediate clinical need, and formal psychometric evaluation was not undertaken.

Hancock *et al.*<sup>26</sup> have provided the only published report of the psychometric properties of the TSEQ. The authors found strong concurrent validity for the TSEQ with the VHI ( $r = 0.910$ ) and V-RQOL ( $r = -0.936$ ) and good test-retest reliability for the TSEQ ( $n = 14$ ;  $r = 0.97$ ), V-RQOL ( $n = 14$ ;  $r = 0.85$ ), and VHI ( $n = 13$ ;  $r = 0.95$ ). The results for concurrent validity are not unexpected considering that the TSEQ was based on the VHI, and that the V-RQOL also contains similar questions to both the TSEQ and the VHI. A key limitation of this psychometric evaluation, however, is that it was conducted on a sample of only 14 participants, restricting the generalizability of these results.

Despite the increasing use of the TSEQ in research and clinical practice,<sup>26</sup> no further psychometric evaluations have been conducted. The present study was designed to redress this limitation. The study was conducted in two phases. Phase I consisted of a systematic review of the TSEQ. This review resulted in the creation of the Transsexual Voice Questionnaire (TVQ), a self-report tool designed to measure the perceptions of MtF transsexuals regarding their voice (Appendix). Because of the potential for the development of a version of the TVQ specifically for female-to-male transsexual individuals, the current questionnaire is designated the TVQ<sup>MtF</sup>. Phase II consisted of a psychometric evaluation of the reliability of the TVQ<sup>MtF</sup>. Both phases of this study were conducted after receiving ethical approval from the La Trobe University Faculty of Health Sciences Human Ethics Committee and the University of British Columbia Behavioural Research Ethics Board.

## PHASE I

### Method

The review of the TSEQ was guided by a review of all aspects of the tool by MtF transsexuals and speech pathologists, and via a thematic analysis of the transcripts of interviews with MtF individuals.

**Review of the TSEQ by MtF transsexuals and speech pathologists.** Two Australian speech pathologists with at least 5 years experience working with MtF transsexuals and two Australian MtF transsexual individuals were recruited to review the content of the TSEQ. One of the MtF individuals had transitioned and was living full-time in the female role, and one was in pretransition stage (ie, living full-time in the male role).

Each of the MtF transsexuals was asked to complete the TSEQ and then comment verbally on the clarity of instructions for completion of the questionnaire, the clarity and relevance of the items, and the overall format of the questionnaire. They were also asked whether there were any additional items relevant to their experience of voice missing from the questionnaire. The two speech pathologists were asked the same questions and sent their responses in writing to the first author. These comments were added to those of the MtF transsexual participants for discussion between the current authors who

then reached consensus as to appropriate changes to be made to the questionnaire.

**Review of the content of the TSEQ through thematic analysis of interview transcripts.** Although both the process of developing the TSEQ and the current review involved inputs from individuals for whom the questionnaire was intended, this input consisted only of responses to the items of the TSEQ. A more robust evaluation of content validity based on the first hand experience of MtF transsexuals when using their female voices, was therefore conducted. Two of the Australian authors of the present study (G.D. and J.D.) had been coinvestigators on a recent qualitative study of 14 MtF transsexuals' experiences of voice and the impact of voice on their everyday lives. The original interviews were undertaken by Byrne<sup>2</sup> as part of her doctoral thesis under the supervision of these two authors. The focus of this thesis was to examine the place of communication in the lives of MtF transsexuals. Byrne applied principles of grounded theory to analyze the interview transcripts. Voice emerged as a major category within a theme relating to social integration. This category contained 137 extracts from the interview transcripts. These extracts were de-identified and constituted the data set for the thematic analysis undertaken for the present study. The World Health Organization ICF framework<sup>10</sup> was used to categorize the extracts according to Activity, Participation, and Psychosocial Well-Being.

The 14 MtF transsexuals who participated in Byrne's in-depth interviews were clients who had attended the La Trobe Communication Clinic (LCC) at La Trobe University, as well as clients from the private practice of a psychiatrist specializing in the care of MtF transsexuals. The participants were aged between 32 and 61 years, had all undergone gender reassignment surgery (GRS), and were living full-time as a female. They were interviewed between 3 months and 13 years 11 months after gender reassignment.

All three Australian authors of the present study (G.D., J.O., and J.D.), speech pathologists with between 10 and 30 years of experience providing clinical services to transsexual clients and/or undertaking research with transsexual individuals, undertook the thematic analysis of the voice-related extracts of the interview transcripts. These authors independently analyzed the transcripts and recorded their results on a form based on the ICF framework. The authors then met to reach consensus regarding themes that emerged from their analysis of the extracts. These themes were subsequently discussed among all five current authors, and consensus was reached regarding items on the TSEQ that should be deleted, added, or modified to improve their clarity.

## Results

**Review of the TSEQ by MtF transsexuals and speech pathologists.** The comments of the speech pathologists and transsexuals were examined by the current authors and resulted in the deletion or modification of some items to reduce ambiguity and limit redundancy. Changes to the response format and

the instructions for completing the questionnaire were also made.

The responses of the MtF individuals identified three of the original items that were unlikely to be representative of their experiences: "People seem irritated with my voice," "People ask what's wrong with your voice," and "I am envious of other women who have more feminine voices than mine." These items were subsequently deleted from the questionnaire. Where a statement was identified as ambiguous, additional wording was inserted to increase the specificity of the item (eg, "My voice makes me feel less feminine *than I would like*," "I avoid using the phone *because of my voice*," and "The pitch range of my *speaking* voice is restricted").

The responses of the pretransition participant in the study highlighted the importance of specifying the target audience for the questionnaire and clarifying the instructions. This participant noted that because she was not yet living in the female role, and because she was not yet attempting to use female speech in the public domain, many of the items were not relevant to her at that time. Two examples of items not relevant to individuals still living full-time in the male role were "I feel the pitch range of my voice is restricted" and "I speak less often with friends, neighbors and relatives because of my voice." As the questionnaire was designed for individuals who are transitioning to their female presentation, it was important to obtain responses from the perspective of presenting in the female role. Subsequently, the instructions for the questionnaire were changed from "How often do you experience the following?" to "Based on your actual experience of living as a female, please tick the response that fits you best."

**Review of the content of the TSEQ through thematic analysis of interview transcripts.** The three Australian authors unanimously agreed that three significant themes emerging from the thematic analysis of the interview extracts were either absent or underrepresented in the TSEQ. The three themes were *The effect of emotion and mood on voice* (as exemplified by the following quotes from the interview transcripts: "Because I'm afraid to express myself when I'm angry... it's [my voice] not gonna sound the way I want," "Um ... it [my voice] goes down when I feel low"), *The presence of voice quality problems* (eg, "I'm having trouble with the voice. And I was very croaky," "About forty, forty five minutes [of talking]... I could feel it starting to crack up, and get all gravelly and go down"), and *Societal responses to voice* (eg, "I looked at her and said 'Gee, they were great weren't they?' in the best voice, the best voice I could do ... 'You have to leave' (she said). Far out. I was really pissed off"). Items added to the questionnaire to more closely represent the views expressed by the interviewees included: "When I am not paying attention my pitch goes down," "My voice gets croaky, hoarse or husky when I try to speak in a female voice," and "I feel discriminated against because of my voice."

The thematic analysis also highlighted the intensity of emotion experienced by individuals when their voice use thwarted attempts to pass in society. The item beginning, "I find it upsetting ..." was replaced by "It distresses me when ..." to more

closely reflect the words and intensity of emotions expressed by the participants.

Finally, four items that were not represented in the thematic analysis of the transcripts were deleted, namely “People seem irritated with my voice,” “People ask what’s wrong with your voice?,” “I am envious of other transsexual women who have a more feminine voice than mine,” and “My voice embarrasses me.”

Once the five authors had agreed on the content of the questionnaire, a final review of the questionnaire items for clarity, redundancy, and structure was undertaken.

**Creation of the TVQ<sup>MtF</sup> for psychometric evaluation.** A total of 30 items were included in the final version of the questionnaire, each describing a perception about voice (See Appendix). A person completing the questionnaire indicates the frequency with which she experiences each of the 30 situations, events or perceptions. The response options are: 1 = never or rarely, 2 = sometimes, 3 = often, and 4 = usually or always. A four-point Likert scale was chosen so that the frequency choices could be clearly different from each other and to prevent the problem of participants using a middle response option to avoid making a clear choice. By adding the response to each of the 30 items, the minimum and maximum scores achievable are 30 and 120, respectively.

The changes that emerged from the review of the TSEQ were substantive and extensive and therefore warranted the new name the TVQ<sup>MtF</sup>.

## PHASE II

Phase II of this study was designed to ascertain the reliability of the TVQ<sup>MtF</sup>. To this end, internal consistency and test-retest concordance were examined.

## Method

**Participants.** All MtF transsexuals referred to the LCC in Melbourne, Australia, in the last 10 years were invited to participate. Participants were also recruited through the private practices of two psychiatrists in Melbourne who specialize in working with the transsexuals. Transsexual individuals who learnt about the research from other transsexuals or via Internet forums were also able to volunteer for the study. Canadian participants from British Columbia were recruited through notices placed in transgender-friendly Health Service Clinics and a pre-

sentation to support group meetings. Given the recruitment procedures used, it was not possible to identify the exact number of people who received notification of the study, thus the response rate could not be calculated.

Forty-five individuals provided a completed questionnaire at time 1 and 2. Data from seven of these participants were not included as their time 2 questionnaires were returned after the required return date. Data from two participants were not included as they attended voice therapy in the period between time 1 and 2, and data from one participant who was living full-time in the male role was also excluded. Consequently, 29 Australian and six Canadian MtF transsexual individuals (35 in total), presenting at minimum part-time in the female role, provided data to enable preliminary psychometric evaluation of the TVQ<sup>MtF</sup>. All participants had either completed voice therapy or were on a waiting list to commence voice therapy. For those who had received therapy, time since therapy ranged from 1 to 9 years. None of the participants underwent phonosurgery at the time of participation in the study. Two participants had undergone phonosurgery, 2 and 4 years before the study, respectively.

The demographic characteristics of the 35 participants are summarized in Table 1. Two participants declined to provide their dates of birth. The mean age of the remaining 33 participants was 52.90 years with a range of 29.80–67 years. Of the 35 participants, 34 lived full-time in the female role and one lived part-time in the female role. The mean time living in the female role was 6.86 years with a range of 0.50–32 years. Fewer than half of the participants had undergone GRS; however, most were taking hormones. Two-thirds of the participants had attended voice therapy sessions in the past. The mean number of years of education for the 34 participants who provided a response was 13.78 years with a range of 9–20 years.

**Psychometric evaluation: internal consistency and test-retest reliability.** Information packages containing a Participant Information Statement, consent form, and the questionnaire were distributed by post, as well as by the participating psychiatrists, to potential Australian MtF participants. The Canadian MtF individuals who responded to the notice advertising the study were provided with information about the project and asked to complete the TVQ<sup>MtF</sup>. The Participant Information Statement indicated that participants were required to complete the questionnaire at two time points, namely time 1, when they received the research information and

**TABLE 1.**  
**Participant Demographics**

| Parameters           | Canadian Mean (Range) | N | Australian Mean (Range) | N  | Total Mean (Range)  | N  |
|----------------------|-----------------------|---|-------------------------|----|---------------------|----|
| Age                  | 54.40 (44.00–62.00)   | 5 | 53.64 (29.80–67.00)     | 28 | 52.90 (29.80–67.00) | 33 |
| Years since GRS      | 4.17 (0.50–10)        | 3 | 8.46 (1.00–31.00)       | 13 | 7.66 (0.50–31.00)   | 16 |
| Years on hormones    | 8.13 (0.50–18.00)     | 4 | 7.93 (0.10–34.00)       | 27 | 7.96 (0.10–34.00)   | 31 |
| Years in female role | 6.57 (0.50–17.00)     | 6 | 6.92 (0.50–32.00)       | 29 | 6.86 (0.50–32.00)   | 35 |
| Number of VTS        | 6.00 (3.00–8.00)      | 3 | 14.00 (4.00–37.00)      | 21 | 13.00 (3.00–37.00)  | 24 |
| Years of education   | 14.50 (11.00–18.00)   | 6 | 13.63 (9.00–20.00)      | 28 | 13.78 (9.00–20.00)  | 34 |

Abbreviations: GRS, gender reassignment surgery; VTS, voice therapy session.



questionnaire, and time 2, 4 weeks later. Participants who returned the completed TVQ<sup>MtF</sup> (time 1) and a demographics questionnaire were sent a second TVQ<sup>MtF</sup> with a request to complete and return the questionnaire 4 weeks after completing the first questionnaire (time 2). Questionnaires received up to 6 weeks after the date of first completion were accepted for test-retest analysis. A total of 35 participants returned the second questionnaire within the 4–6 week test-retest interval. The test-retest period was selected in line with the guidelines provided by Portney and Watkins.<sup>27</sup>

**Statistical analysis.** Classical test theory was applied to evaluate the TVQ<sup>MtF</sup>. The reliability of the questionnaire was assessed using the following statistical tests:

1. Cronbach's alpha ( $\alpha$ ): This coefficient provides a measure of the internal consistency of the items on the scale (how closely related the items are as a group). It is a function of the number of test items and the average intercorrelation among the items. The value of Cronbach's  $\alpha$  ranges from .0 to 1.0, and the closer it is to 1.0, the greater the internal consistency of the items in the scale.<sup>27</sup>
2. Item-total correlations (ITCs): The ITC measures the correlation of each item with the total score. Items with a low ITC (<0.20) are considered poor items, as they may not be measuring the same construct as the overall scale and do not discriminate well between respondents who have a high total score and those who have a low total score on the scale.<sup>28</sup>
3. Intraclass correlation coefficient (ICC): This coefficient provides an index of agreement or consistency across measurements and was used to assess test-retest reliability.<sup>27</sup> The magnitude of the ICC ranges from 0.0 to 1.0. The closer the ICC is to 1.0, the better the temporal stability of the responses to the items in the scale over the test-retest interval.

All statistical analyses were performed using *SPSS* statistics version 19. Statistical analysis of these data also provided an opportunity to examine how a group of MtF individuals viewed vocal functioning and the impact of voice on their everyday lives. These results are reported in the following section.

## Results

**Psychometric evaluation: internal consistency and test-retest reliability.** Before statistical analysis, participant responses were screened for systematic errors and missing data. A total of seven items were unanswered, five at time 1 and two at time 2, that is, only seven of a possible 2280 items were unanswered. Unanswered responses were distributed randomly throughout the data. Missing values were replaced with the mean score across participants for that item.<sup>29</sup>

Cronbach's alpha was used to evaluate the internal consistency of the items for both time points. At time 1, the internal consistency coefficient was  $\alpha = .964$  and at time 2,  $\alpha = .974$ . These results demonstrate the TVQ<sup>MtF</sup> has a high level of internal consistency/reliability. The ITC for time 1 ranged from 0.39

for item 1 ("People have difficulty hearing me in a noisy room") to 0.85 for item 17 ("My voice difficulties restrict my social life"; Table 2). The ITC was 0.6 or higher for 24 of the items. ITCs were similar at time 2. The magnitude of the ITCs demonstrates a moderate-to-strong degree of homogeneity in the perceptions sampled by the items on the questionnaire.<sup>27</sup> Strong homogeneity and high internal consistency show that the TVQ<sup>MtF</sup> items measure related aspects of the same construct, in this case the perceptions of MtF transsexuals regarding their voice.

The ICC (model 3) was used to evaluate the test-retest reliability of the TVQ<sup>MtF</sup>. The resultant ICC was high, demonstrating excellent stability of the measure over time: ICC average measure = 0.979 (95% confidence interval = 0.968–0.988).<sup>27</sup>

**Effect of demographics and gender transition attributes on TVQ<sup>MtF</sup> score.** Pearson's correlation coefficients were calculated to examine the strength and direction of association between demographic characteristics and the gender transition attributes of the participants and their total TVQ<sup>MtF</sup> scores. There were no significant correlations for age, years of education, and number of speech therapy sessions. The association between time in the female role and TVQ<sup>MtF</sup> total score ( $r = -.238$ ,  $P = 0.042$ ) was low, but significant. Participants who had lived longer in the female role tended to have lower TVQ<sup>MtF</sup> scores i.e., overall they perceived fewer voice-related difficulties and psychosocial impacts.

**Perceptions of vocal functioning and voice-related impact on everyday life.** The overall mean rating across all the 30 items at time 1 was 2.37. The minimum and maximum means recorded on an item were 1.63 and 3.09, respectively. The overall mean rating across all 30 items at time 2 was 2.45. The minimum and maximum means recorded on an item were 1.54 and 3.09, respectively. The means were approximately symmetrically distributed with minimal skewness at time 1 of 0.079 (standard error [SE] = 0.398) and at time 2 of  $-0.053$  (SE = 0.398). There was acceptable kurtosis at time 1 of  $-1.255$  (SE = 0.778) and at time 2 of  $-1.207$  (SE = 0.778). The mean total score of the TVQ<sup>MtF</sup> at time 1 was 71.23 (standard deviation [SD] = 22.27) with a range of 34–107. The mean total score of the TVQ<sup>MtF</sup> at time 2 was similar to time 1, that is, 73.42 (SD = 22.34) with a range of 33–113. As the descriptive statistics for time 1 and 2 are very similar, only the data for time 1 are presented in Table 2.

The item-by-item nature of the reliability calculations provided the data necessary to identify the concerns of this group of MtF individuals as to their vocal functioning and the impact of voice on everyday life. This was achieved by examining the mode, that is, most frequently used, response for each TVQ<sup>MtF</sup> item.

Seven items (items 3, 4, 15, 20, 24, 26, and 28) were associated with a single mode of 4 (the response category consistent with the highest frequency of *usually or always*). Two of these items capture the individuals' perceptions of their vocal functioning (items 4 and 15). The remaining five items represent psychosocial impacts of voice (items 3, 20, 24, 26, and 28). Means and medians for each of these seven items were

**TABLE 2.**  
**Descriptive Statistics for Time 1**

| TVQ Items   | Mean | SD   | Minimum–Maximum | Median | Mode (%)*                    | ITC  |
|---|------|------|-----------------|--------|------------------------------|------|
| 28 It distresses me when I'm perceived as a man because of my voice                     | 3.09 | 1.20 | 1–4             | 4      | 4 (60.00)                    | 0.62 |
| 15 I have to concentrate to make my voice sound the way I want it to sound              | 3.09 | 1.17 | 1–4             | 4      | 4 (54.30)                    | 0.71 |
| 4 The pitch of my speaking voice is too low   | 2.98 | 1.03 | 1–4             | 3      | 4 (42.90)                    | 0.74 |
| 26 I feel self-conscious about how strangers perceive my voice                          | 2.89 | 1.11 | 1–4             | 3      | 4 (40.00)                    | 0.84 |
| 24 I feel my voice does not reflect the "true me"                                       | 2.87 | 1.25 | 1–4             | 3      | 4 (48.60)                    | 0.82 |
| 3 My voice makes me feel less feminine than I would like                                | 2.83 | 1.07 | 1–4             | 3      | 4 (37.10) <sup>†</sup>       | 0.81 |
| 16 I feel frustrated with trying to change my voice                                     | 2.64 | 1.10 | 1–4             | 3      | 4 and 2 (31.40) <sup>‡</sup> | 0.76 |
| 20 My voice doesn't match my physical appearance  | 2.71 | 1.18 | 1–4             | 3      | 4 (37.10)                    | 0.77 |
| 18 When I am not paying attention my pitch goes down                                    | 2.86 | 1.00 | 1–4             | 3      | 2 (40.00) <sup>†</sup>       | 0.64 |
| 29 The pitch range of my speaking voice is restricted                                   | 2.80 | 1.02 | 1–4             | 3      | 2 (37.10) <sup>†</sup>       | 0.62 |
| 21 I use a great deal of effort to produce my voice                                     | 2.54 | 1.12 | 1–4             | 2      | 2 (34.30) <sup>†</sup>       | 0.82 |
| 10 My voice makes it hard for me to be identified as a woman                            | 2.51 | 1.10 | 1–4             | 2      | 2 (34.30)                    | 0.83 |
| 11 When I speak the pitch of my voice does not vary enough                              | 2.49 | 0.95 | 1–4             | 2      | 2 (40.00)                    | 0.59 |
| 19 When I laugh I sound like a man  | 2.49 | 1.17 | 1–4             | 2      | 2 (37.10) <sup>†</sup>       | 0.64 |
| 5 The pitch of my voice is unreliable   | 2.46 | 0.92 | 1–4             | 2      | 2 (48.60)                    | 0.43 |
| 1 People have difficulty hearing me in a noisy room                                     | 2.29 | 0.96 | 1–4             | 2      | 2 (37.10)                    | 0.39 |
| 22 My voice gets tired quickly  | 2.29 | 1.07 | 1–4             | 2      | 2 (31.40)                    | 0.60 |
| 2 I feel anxious when I know I have to use my voice                                     | 2.17 | 0.99 | 1–4             | 2      | 2 (37.10)                    | 0.64 |
| 13 I avoid speaking in public because of my voice                                       | 2.09 | 1.07 | 1–4             | 2      | 2 (40.00)                    | 0.74 |
| 14 My voice sounds artificial   | 2.09 | 0.98 | 1–4             | 2      | 2 (40.00)                    | 0.69 |
| 8 I'm tense when talking with others because of my voice                                | 1.91 | 0.92 | 1–4             | 2      | 2 (42.90)                    | 0.69 |
| 27 My voice "gives out" in the middle of speaking                                       | 1.85 | 0.81 | 1–4             | 2      | 2 (42.90)                    | 0.67 |
| 25 I am less outgoing because of my voice   | 2.26 | 1.22 | 1–4             | 2      | 1 (37.10)                    | 0.78 |
| 6 My voice gets in the way of me living as a woman                                      | 2.09 | 1.31 | 1–4             | 1      | 1 (54.30)                    | 0.78 |
| 17 My voice difficulties restrict my social life  | 2.00 | 1.11 | 1–4             | 2      | 1 (45.70)                    | 0.85 |
| 30 I feel discriminated against because of my voice                                     | 1.97 | 1.18 | 1–4             | 2      | 1 (48.60)                    | 0.65 |
| 9 My voice gets croaky, hoarse or husky when I try to speak in a female voice           | 1.94 | 1.00 | 1–4             | 2      | 1 (40.00)                    | 0.65 |
| 23 My voice restricts the sort of work I do   | 1.79 | 0.96 | 1–4             | 1.66   | 1 (48.60)                    | 0.45 |
| 12 I feel uncomfortable talking to friends, neighbors and relatives because of my voice | 1.63 | 0.88 | 1–4             | 1      | 1 (57.10)                    | 0.53 |
| 7 I avoid using the phone because of my voice   | 1.63 | 0.77 | 1–3             | 1      | 1 (54.30)                    | 0.40 |

N = 35 participants.

Abbreviation: ITC, item-to-total correlation.

\* Percentage of individuals who responded with this response category.

<sup>†</sup> Difference in number of respondents for response categories 2 and 4 was two or lower.

<sup>‡</sup> Equal number of respondents to category responses 2 and 4.

consistent with the modes. The two items that were rated as occurring *usually* or *always* by the most respondents (54.3–60%) were items 15 (concentration required to achieve desired voice) and 28 (distress when perceived as a man owing to voice).

There were no items with a mode response of 3 (response category *often*). Ten of the items had a single response mode of 2 (*sometimes*). Five of these items (items 1, 5, 11, 22, and 27) related to vocal functioning (endurance, fatigue, and reliability). Four items related to psychosocial impact of voice (items 10, 2, 14, and 8) and one item to restrictions to participating in society (item 13). The mean of these items with a mode response of 2 ranged between 1.85 and 2.51, and the median for all items was 2.

The remaining eight items (items 6, 7, 9, 12, 17, 23, 25, and 30) had a mode response of 1 (*never or rarely*). Six of these eight items related to Activity/Participation restrictions (items 6, 7, 12, 17, 23, and 30) and one to psychosocial impact (item 25). Only one item related to vocal functioning (item 9; diminished voice quality). The mean of these items ranged between 1.63 and 2.60, and the median between 1 and 2. The most infrequently perceived experiences (represented by items 7 and 12) also had the lowest mean, median, and mode, and the highest proportion of participants (54.3–57.1%) endorsing this low frequency response.

For six items, there was no clear mode. Item 16 had a bimodal response (modes 2 and 4) and pertained to the psychosocial impact of voice. For five items (items 3, 18, 19, 21, and 29), the response was close to bimodal (modes close to 2 and 4). On these items, the difference between the number of participants who selected response category 2 as compared with response category 4 differed by only one or two participants. One of these items (item 3) reflects voice-related psychosocial impact, whereas the remaining four (items 18, 19, 21, and 29) relate to vocal functioning. The mean for these items that were bimodal or close to bimodal ranged between 2.49 and 2.83, and the median ranged between 2 and 3.

The number of participants who selected the modal frequency response for each item ranged from 31.4% to 60%; however, only five modal responses were selected by more than 50% of the participants. For some items, outside of the modal response, similar numbers of participants selected each response category. Item 10 (voice makes it hard for me to be identified as a woman) provides an example of this pattern: response 1 (*never or rarely*), 20%; response 2 (*sometimes*), 34.3%; response 3 (*often*), 20%; and response 4 (*usually or always*), 25.7%.

## DISCUSSION

The reported discrepancy between clinical perceptions and the perceptions of transsexual clients regarding their vocal functioning,<sup>17,18</sup> the influence of context on voice functioning,<sup>2,4</sup> and the adoption of the ICF framework in speech pathology practice<sup>11,12,14</sup> all underpin the need to ascertain the perceptions of MtF transsexuals regarding their vocal functioning and the impact of voice on their everyday lives. Although the TSEQ provided the only population-specific self-report measure to

obtain these perceptions, this tool had not been evaluated psychometrically. In this study, a group of speech pathologists and MtF transsexuals identified the need to modify the TSEQ. The necessity for changing the TSEQ was also demonstrated through thematic analysis of the transcripts of interviews of 14 MtF transsexual individuals. The significant changes that followed resulted in creation of the TVQ<sup>MtF</sup> that was subjected to preliminary psychometric evaluation (internal consistency and test-retest reliability) in a sample of 35 participants. The responses of the 35 participants to the questionnaire also provided insights into the perceptions of MtF transsexuals regarding their vocal functioning and voice-related impacts on their lives.

## Psychometric evaluation: internal consistency and test-retest reliability

Findings from phase II of the study indicated that TVQ<sup>MtF</sup> as a reliable measure of the perceived voice-related difficulties and impact on the lives of MtF transsexual individuals. A high level of internal consistency was demonstrated (Cronbach's  $\alpha = .964-.974$ ) indicating that less than 10% of the variance in questionnaire scores could be attributed to error or unknown constructs. The magnitude of the ITCs also indicated moderate-to-strong homogeneity among the items on the questionnaire. Distribution indices of skewness and kurtosis were excellent to acceptable, and all met the minimal psychometric requirements. Test-retest reliability over a 4-week period was excellent (ICC = 0.975), indicating stability of response over this time period. Although further investigation of the validity of the TVQ<sup>MtF</sup> is required, the strong psychometric properties of the tool demonstrated in this group of MtF transsexuals indicate that it is likely to be valuable for clinical and research use.

## Perceptions of vocal functioning and voice-related impact on everyday life

The psychometric evaluation of the TVQ<sup>MtF</sup> afforded the opportunity of exploring perceptions of this group of MtF individuals as to their vocal functioning and the impact of voice on their everyday lives. The participants in this study varied considerably in their perceptions of voice-related difficulties and impact. This variation was evident in TVQ<sup>MtF</sup> total scores that covered almost the total score range and in item ratings that covered the full range of scores for all but one of the items (item 7).

The range of total scores of the participant group at time 1 indicated that some of the participants *never or rarely* experienced voice-related difficulties and impacts, whereas others experienced these more frequently. This variability in individual scores and the significant negative correlation between time in the female role and TVQ<sup>MtF</sup> total score found in the present study may be explained by the findings of Byrne.<sup>2</sup> Byrne reports that, with time, the participants in her study became more focused on “getting on with life” and less concerned with “changing themselves to appease society’s demand for a flawlessly gendered presentation” (p135).

In the present study, the most frequently occurring problems reported by the participants were related to the psychosocial impacts of voice. Problems reported to occur less frequently

related largely to vocal functioning, whereas the least problematic experiences related to limitations in the ICF domains of Activity and Participation (eg, “My voice difficulties restrict my social life”).

The most frequently experienced psychosocial impact reported was distress at being perceived as a man because of the individual’s voice. The fact that these participants, many of whom had undergone voice modification and spent a number of years in the female role, continued to experience distress, supports the ongoing need for inclusion of psychosocial counseling as part of voice and communication therapy. The presence of ongoing voice-related psychosocial consequences was also reflected in the participants’ perceptions that their voice did not match their physical appearance, did not reflect their “true selves,” and made them feel less feminine. The fact that voice was often perceived as having an impact on the individual’s self-identity provides support for the therapy goal of achieving a voice that feels authentic to MtF individuals<sup>30</sup> and underlines the importance of involving the client in determining the vocal characteristics to be modified and attained in therapy.

In relation to vocal functioning, participants most frequently reported difficulties with low pitch and a perceived need to concentrate to produce their desired voice. The reported need to concentrate to achieve desired voice has been alluded to in earlier reports<sup>12,14</sup> and highlights the fact that attainment of desired female voice is difficult to achieve at an automatic level of functioning. As the participants in this study had been living full-time in the female role for up to 32 years, the current findings suggest that long-term voice change for a significant number of MtF individuals requires ongoing attention. Participants’ reports were also consistent with frequent difficulties pertaining to vocal endurance (vocal fatigue, stamina, and control).

The least frequently occurring among the voice-related problems was diminished vocal quality. Although the findings related to vocal function support statements that the voice focus of MtF individuals is a desirable voice pitch,<sup>3</sup> the presence of diminished vocal endurance and voice quality in the MtF population should not be overlooked. For example, although almost half of the participants did not experience diminished vocal quality, almost a quarter of the participants did. Research reports of voice outcomes for MtF individuals rarely report on voice quality. Similarly, these reports rarely include comments on the vocal effort or concentration required to achieve the desired voice, or the individual’s ability to sustain their desired pitch over time. The need for inclusion of these parameters in voice assessment and studies of therapy outcomes is highlighted by the current findings. The current findings also support the common clinical focus on vocal hygiene,<sup>31</sup> ensuring optimal breath support for voice change<sup>32</sup> and the recent focus on vocal stamina and endurance.<sup>33</sup>

Of all the items, it was those related to either activity limitations or participation restrictions that were least likely to occur. This result was an encouraging finding indicating that almost half of the participants did not experience restrictions in daily life because of their voice. Of all the experiences represented in the TVQ<sup>MtF</sup>, the three least problematic were, “I feel uncom-

fortable talking to friends, neighbors and relatives because of my voice,” “I avoid using the phone because of my voice,” and “My voice gets in the way of me living as a woman.” The first of these findings is consistent with earlier reports<sup>2,14</sup> that MtF individuals are relatively comfortable talking to those with whom they are familiar. The latter two findings, relating to telephone avoidance and living as a woman were, however, unexpected. In view of the fact that many MtF individuals who attend speech therapy report significant dissatisfaction when speaking on the telephone, for example, disability with regard to gender identity,<sup>25</sup> and activity limitation when conducting business,<sup>2</sup> it was expected that telephone avoidance would be reported more frequently. This unexpected finding may simply reflect the fact that the TVQ<sup>MtF</sup> item asks about telephone avoidance rather than difficulty surrounding telephone communication, or as was the case of the study by T’Sjoen *et al*,<sup>25</sup> gender identification on the telephone. Individuals may still experience distress and dissatisfaction surrounding telephone communication although they do not avoid it. It is also possible that the difficulty associated with the telephone has lessened in significance with technological advances that provide many nonvocal (texting and e-mailing) options for communicating and conducting business. The finding that this group of transsexuals did not report that their voice was a major hindrance to living as a woman may be explained by the findings of Byrne<sup>2</sup> who reported that people who had made the decision to live in the female role were freed from the “misery of pretending to be male” (p160) and were able to move forward in life as a woman.

## LIMITATIONS

Psychometric evaluation of the TVQ<sup>MtF</sup> in this study was limited to examination of reliability (internal consistency and test-retest reliability). A larger sample size would have been required for evaluation of other psychometric properties including construct validity. Although the sample size for this study was moderately large for this population, the findings concerning participants’ perceptions of their vocal functioning and voice-related impacts on their lives cannot be generalized to the broader population of MtF individuals. Participants were not randomly selected; most were from Melbourne, Australia, and most had undergone speech therapy.

## CONCLUSION

Notwithstanding the limitations outlined previously, the present study demonstrates that the TVQ<sup>MtF</sup> provides a reliable self-report measure of vocal functioning and of the impact of voice on the everyday lives of MtF transsexuals. Our initial psychometric tests indicated good levels of internal consistency and test-retest reliability. The TVQ<sup>MtF</sup> responses from this group of transsexuals do show a wide range of individual variability in perceptions of vocal functioning and voice-related difficulties. However, the data also revealed some common response patterns. Comparative item analyses indicated that voice-related psychosocial difficulties were most frequently encountered. The findings in the present study, both from



statistical tests of reliability and descriptive analyses of response patterns, support the clinical utility of the TVQ<sup>MTF</sup> and suggest the value of further psychometric evaluation.

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## APPENDIX

The Transsexual Voice Questionnaire (TVQ<sup>MTF</sup>) is also freely available for clinical and research purposes from either the first author or at [www.shelaghdavies.com](http://www.shelaghdavies.com).